

**PILOT LEARNING
CALCULUS II ENGINEERING
PROBLEM-SET 4
FALL 2019**

(1) Evaluate the following integrals

(a) $\int \frac{2}{x(\ln x)^2} dx$

(b) $\int \frac{x^2+1}{x^3-2x^2+x} dx$

(c) $\int \frac{1}{x^2+4} dx$

(d) $\int \ln(x^2 - 1) dx$

(2) Determine whether the following improper integral is convergent or divergent. If the integral is convergent, find its value.

$$\int_0^{\infty} x e^{-x} dx$$

(3) Use the comparison test to determine if the following integral converges.

$$\int_1^{\infty} \frac{\sqrt{1+x \cos^2 x}}{x^2} dx$$

(4) Which of the following differential equations does the function $y(x) = x^3 \cos x$ satisfy?

(a) $y' = 3x^2 \cos x - \tan(x)y$

(b) $y' = 3y \cos(x) - x^3 \sin(x)$

(c) $y' = \frac{3y}{x} - x^3 \sin(x)$